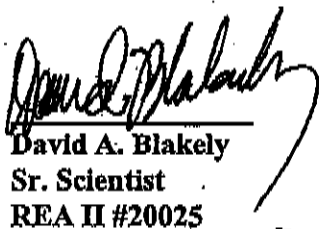


2003 1st QUARTER GROUNDWATER MONITORING REPORT

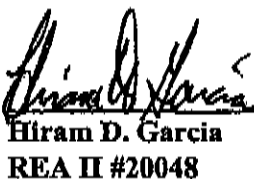
FOR

**FORMER ANGELES CHEMICAL
COMPANY FACILITY
8915 SORENSEN AVENUE
SANTA FE SPRINGS, CALIFORNIA**

Prepared by:
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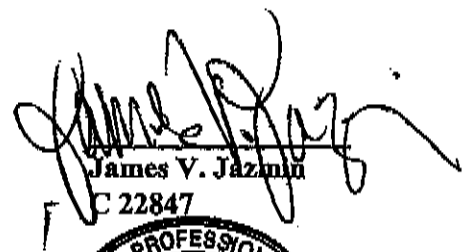

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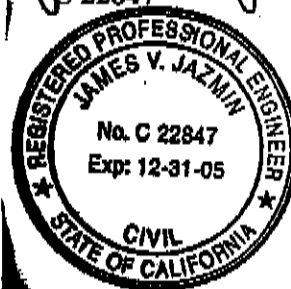



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August 14, 2003


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1.0) INTRODUCTION

Blakely Environmental Investigations, Inc. (BEII) was contracted by Greve Financial Services ((310) 753-5770) to perform quarterly groundwater monitoring at the former Angeles Chemical Company (ACC), Inc. facility located at 8915 Sorensen Avenue, Santa Fe Springs, California (See Figure 1, Site Location Map). The quarterly groundwater monitoring was requested by the Department of Toxics Substance Control (DTSC) correspondence dated September 18, 2001. This report presents the results of the 2003 1st quarter monitoring episode performed from March 10 through 12, 2003.

2.0) SITE LOCATION AND HISTORY

The site is approximately 1.8 acres in size and completely fenced. The site is bound by Sorensen Avenue on the east, Air Liquide Corporation to the north and northwest, Plastall Metals Corporation to the north, and a Southern Pacific Railroad easement and McKesson Chemical Company to the south.

The property was owned by Southern Pacific Transportation Company and was not developed until 1976.

The ACC has operated as a chemical repackaging facility since 1976. A total of thirty-four (34) underground storage tanks (USTs) existed beneath the site. Two (2) USTs, one gasoline and one diesel, and sixteen (16) chemical USTs were excavated and removed under the oversight of the Santa Fe Springs Fire Department. All 16 remaining chemical USTs were decommissioned in place and slurry filled.

In January 1990, SCS Engineers, Inc. (SCS) conducted a site investigation. SCS advanced eight borings from 5' below grade (bg) to 50' bg. Soil samples collected and analyzed identified benzene, 1,1-Dichloroethane (1,1-DCA), 1,1-Dichloroethene (1,1-DCE), MEK, methyl isobutyl ketone (MIBK), toluene, 1,1,1 Trichloroethane (1,1,1-TCA), Tetrachloroethylene (PCE), and xylenes at detectable concentrations.

In June 1990, SCS performed an additional site investigation at the site by advancing six additional borings advanced from 20.5' bg to 60' bg. A monitoring well (MW-1) was also installed. Soil sample analysis identified detectable concentrations of the above mentioned VOCs in addition to acetone and methylene chloride. Dissolved benzene, 1,1-DCA, 1,1-DCE, PCE, Trichloroethylene (TCE), and trans-1,2-dichloroethene were detected in MW-1 above maximum contaminant levels.

Between 1993 and 1994, SCS performed further testing at the site. Soil samples were collected from nine borings. Five borings were converted to groundwater monitoring wells MW-2, MW-3, MW-4, MW-6, and MW-7 (See Figure 2, Well Location Map). The predominant compounds detected in soil were acetone, MEK, MIBK, PCE, toluene, 1,1,1-TCA, TCE, and xylenes. Groundwater sample collection performed in

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8' bg. Based on the soil vapor sample results, BEII identified relatively low level concentrations of VOCs in the silty clay soils at 8' bg. However, the concentrations of VOCs are significantly higher in the sandy soils at 20' bg in OU-1. Results were submitted to the DTSC by BEII in a Report of Findings dated January 10, 2001 with laboratory reports (BEII Report of Findings dated January 10, 2001).

On November 30, 2000, Blaine Tech Services, Inc. (Blaine) was contracted to perform groundwater sampling at the site. Groundwater monitoring wells MW-4 and MW-6 identified were not sampled due to the presence of free product. These wells were installed to monitor a perched groundwater body to the north. Free product was identified in MW-1 during sample collection, upon completion of well purging. The potentiometric groundwater level was above the well screen. Groundwater purging lowered the potentiometric level below the screened interval, allowing free product to enter. Groundwater sample analysis identified thirteen constituents of concern (COCs) in the dissolved phase as VOCs only. Laboratory analysis of metals and SVOCs identified concentrations below allowable levels for those constituents. Results were submitted by BEII to the DTSC in a Report of Findings dated January 10, 2001 with laboratory reports.

The remaining USTs have been excavated or slurry filled for closure under the supervision of the Santa Fe Springs fire Department. A report was be submitted to the DTSC upon completion by EREMCO.

BEII performed a soil gas survey on the ACC site from January 14 to January 17, 2002. The purpose of the soil gas survey was to determine the lateral extent of VOC soil vapors in the vadose zone along the eastern, northern, and southern property line of the site (OU-1 an OU-2). In addition, BEII performed a SGS on June 13, 2002 on the Air Liquide property to determine the lateral extent of VOC soil vapors in the vadose zone north of the ACC facility (OU-1). Based on the soil gas survey results, BEII identified relatively low level concentrations of VOCs in the silty clay soils at 5' bg, 7'bg, 8' bg, 10' bg, and 12' bg (See Table 1 through Table 3 for soil gas results). However, the concentrations of VOCs are significantly higher in the sandy soils at 20' bg, which are more permeable and conducive to soil vapor migration. Furthermore, VOC soil gas concentrations were higher along the southern property line (OU-2) than along the east and north property line. Results were submitted by BEII to the DTSC in a Report of Findings dated October 15, 2002 with laboratory reports.

BEII advanced two soil borings (BSB-1 and BSB-2) and installed two groundwater monitoring wells (MW-8 and MW-9) on the ACC site from June 5 to June 7, 2002. The purpose of the drilling was to help define the lateral and vertical extent of impacted soil along the eastern ACC property line and to help determine the extent of impacted groundwater. Soil borings BSB-1 and BSB-2 were advanced to 50' bg and 30' bg, respectively. Monitoring wells MW-8 and MW-9 were installed to 40.5' bg and 45.5' bg, respectively. Soil sample results identified only four VOCs in the upper clay layer from 0' to approximately 20' bg. Total VOC soil concentrations averaged 56.66 µg/kg in the upper clay zone. Soil sample results identified elevated VOC concentrations in sand

with lower to no detectable concentrations in the underlying clay layer. The average total VOC soil concentrations were 53,125 µg/kg in the permeable sand layer. The underlying clay layer identified an average total VOC soil concentration of 408 µg/kg. Results were submitted by BEII to the DTSC in a Report of Findings dated October 15, 2002 with laboratory reports.

BEII advanced eight soil borings (BSB-3 through BSB-10) from 40' bg to 45' bg in August 2002 to help determine the extent of impacted soil. Laboratory results were submitted by BEII to the DTSC.

In November and December of 2002, BEII advanced seven borings (BSB-11 through BSB-17) and installed twelve monitoring wells (MW-10 through MW-21) to help define the extent of VOC impacted soil and groundwater. Monitoring well MW-1 was abandoned. Laboratory results were submitted by BEII to the DTSC.

3.0) REGIONAL GEOLOGY/HYDROGEOLOGY

The site is located near the northern boundary of the Santa Fe Springs Plain within the Los Angeles Coastal Plain at an elevation of approximately 150 feet above mean sea level. Surficial sediments consist of fluvial deposits composed of inter-bedded gravel, sand, silt, and clay. Available data from California Water Resources Bulletin No. 104 (June 1961) indicate that the surficial sediments may be Holocene and/or part of the upper Pleistocene Lakewood Formation, which ranges from 40 to 50 feet thick beneath the site. The Lakewood Formation has lateral lithologic changes with discontinuous permeable zones that vary in particle size. Stratified deposits of sand, silty sand, silt, and fine gravel comprising the upper portion of the lower Pleistocene San Pedro Formation underlies the Lakewood Formation.

The site lies within the Central Basin Pressure area, a division of the Central Ground Water Basin, which extends over most of the Coastal Plain. The Gasper aquifer, a part of the basal coarse unit of Holocene deposits, is found within old channels of the San Gabriel and other rivers. The Gasper aquifer may be 40-feet in thickness, with its base at a depth of about 80 to 100-feet bg. The underlying Gage aquifer is found within the Pleistocene Lakewood Formation. The Hollydale aquifer is the uppermost regional aquifer in the Pleistocene San Pedro Formation. Bulletin 104 indicates that this aquifer averages approximately 30-feet in thickness in this area, with its top at a depth of about 70 feet bg. The major water producing aquifers in the region are the Lynwood aquifer located approximately 200-feet bg, the Silverado aquifer located at approximately 275-feet bg, and the Sunnyside aquifer located at approximately 600-feet bg.

4.0) SITE GEOLOGY/HYDROGEOLOGY

SCS identified silty clays with some minor amounts of silt and sand in the shallow subsurface from surface grade to approximately 15' bg. Below the silty clay, poorly sorted coarse-grained sand and gravel from 15' bg to 26' bg. SCS referenced a less

permeable silty clay layer between 35' and 50' bg, which contained stringers of fine sand and silt that is part of the Gaspar/Hollydale aquifer.

A perched aquifer was encountered at approximately 23' bg by SCS and referenced as such by SCS. Based on a review of McKesson files, Harding Lawson Associates (HLA) stated that in January 1975 prior to McKesson operating their neighboring facility, no groundwater was encountered to a depth of 45' bg beneath the McKesson property. In March 1986, during operation of the neighboring McKesson facility, groundwater was encountered at 22' bg beneath the McKesson property as stated by HLA. Based on the HLA statements, BEII concludes with SCS that the first encountered groundwater is part of a shallow perched aquifer. The sediments within this perched aquifer appear to be consistent with the Gaspar Aquifer. Monitoring wells MW-4, MW-6, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-16, MW-18, and MW-19 will be noted as Gaspar monitoring wells with groundwater at approximately 30' bg.

SCS also referenced that the Gaspar/Hollydale Aquifer was encountered at 20' to 35' bg beneath the site. Further review of Bulletin 104 by BEII and DTSC, identified that the SCS referenced Gaspar/Hollydale Aquifer was in fact the Gage/Hollydale Aquifer. Monitoring wells MW-2, MW-3, MW-13, MW-14, MW-15, MW-17, MW-20, and MW-21 will be noted as Gage/Hollydale monitoring wells since they are screened in that deeper groundwater which is now at approximately 40' bg.

The groundwater gradient flowed historically to the southwest as identified by SCS. In March 2003, the shallow groundwater was identified at depths between 26.36' bg to 35.36' bg beneath the site. The groundwater flow direction of this shallow zone (Gaspar Aquifer) is generally north northeast with a hydraulic gradient of 0.01 ft/ft (See Figure 3). Groundwater in the deeper Gage/Hollydale was identified at depths between 38.28' bg to 41.53' bg beneath the site. The Gage/Hollydale Aquifer flows in the west southwest direction with a relatively flat hydraulic gradient of 0.007 ft/ft (See Figure 4).

5.0) GROUNDWATER MONITORING PROTOCOL

The purpose of the proposed groundwater monitoring was to provide data regarding the piezometric surface, water quality, and the presence of free product (FP), if any on a quarterly basis to the DTSC. Groundwater monitoring consisted of such activities as water level measurement, well sounding for detection of FP, collection of groundwater samples, field analysis, laboratory analysis, and reporting. The proposed work was performed as follows:

The depth to groundwater was measured in each well using a decontaminated water level indicator capable of measuring to within 1/100th of a foot. Prior to and following collection of measurements from each well, the portions of the water level indicator entering groundwater were decontaminated using a 3-stage decontamination procedure consisting of a potable wash with water containing Liquinox soap followed by a double purified water rinse. Wells were monitored in the order of least contaminated to

the most contaminated based on past analysis. For the ACC wells, the following order of wells was followed: MW-17, MW-20, MW-15, MW-13, MW-9, MW-21, MW-12, MW-7, MW-14, MW-3, MW-16, MW-2, MW-11, MW-18, MW-19, MW-10, MW-4, MW-6, and MW-8.

The well box and casing were opened carefully to preclude debris or dirt from falling into the open casing. Once the well cap was removed, the water level indicator was lowered into the well until a consistent tone was registered. Several soundings were repeated to verify the measured depth to groundwater. The depth of groundwater was measured from a reference point marked on the lip of each well casing. A licensed surveyor has surveyed the elevation of each reference point. The result was recorded on the field sampling log for each well. Other relevant information such as physical condition of the well, presence of hydrocarbon odors, etc. was also recorded as appropriate on the field sampling log.

The well sounder used for this project was equipped to measure free product (FP) layers thicker than 0.1 inches. FP was indicated as light non-aqueous phase liquid (LNAPL) or dense non-aqueous phase liquid (DNAPL).

Groundwater purging was conducted immediately following the collection of a groundwater depth measurement from all monitoring wells. Groundwater samples were analyzed for the following constituents:

- Volatile organic compounds (VOCs) using EPA Method 8260B to include all Tentatively Identified Compounds (TICs).
- Total Petroleum Hydrocarbons as gasoline (TPH-gas) using EPA Method 8015 modified.

5.1) Well Purging and Measurement of Field Parameters

Wells were purged in the following order MW-17, MW-20, MW-15, MW-13, MW-9, MW-21, MW-12, MW-7, MW-14, MW-3, MW-16, MW-2, MW-11, MW-18, MW-19, and MW-10 to minimize the potential for cross contamination. The wells were purged by Blaine Tech Services, Inc (Blaine) and sampled by BEII from March 10 through 12, 2003 in the presence of Mr. Sanford Britt of the DTSC. The purge protocol was presented in the Field Sampling Plan as Appendix A in the Groundwater Monitoring Work Plan dated October 23, 2001 and submitted to the DTSC.

Prior to purging, casing volumes was calculated based on total well depth, standing water level, and casing diameter. One casing volume was calculated as:

$$V = \pi(d/2)^2 h \times 7.48$$

where:

V is the volume of one well casing of water (in gallons, $1 \text{ ft}^3 = 7.48$ gallon);

d is the inner diameter of the well casing (in feet); and

h is the total depth of water in the well - the depth to water level (in feet).

A minimum of three casing volumes of water was purged from each well. Water was collected into a measured bucket to record the purge volume. All purged groundwater was containerized in 55-gallon hazardous waste drum for disposal at a later date.

After each well casing volume was purged; water temperature, pH, specific conductance (EC), and turbidity were measured using field test meters and the measurements were recorded on Well Monitoring Data Sheets (See Appendix A). Samples were collected after these parameters have stabilized; indicating that representative formation water has entered the well. The temperature, pH, and specific conductance should not vary by more than 10 percent from reading to reading. Turbidity should be less than 5 NTUs, however, the purging process stirred up silty material in each well which made the turbidity measurements of 5 NTUs unattainable. Groundwater samples were collected after water levels recharged to 80 percent of the static water column. Notations of water quality including color, clarity, odors, sediment, etc. were also noted in the data sheets.

All field meters were calibrated according to manufacturers' guidelines and specifications before and after each day of field use. Field meter probes were decontaminated before and after use at each well. The pH, conductivity, and temperature were measured with a Myron-L Ultra Meter and turbidity was measured with a HF Scientific DRT-15C meter. The calibration standards used for pH were 4 and 7 with expiration dates of July 2003. Conductivity was calibrated to a 3900 μS standard with an expiration date of July 2003. A 0.02 NTU standard was used to calibrate the turbidity with an expiration date of July 2003.

5.2) Well Sampling

Groundwater samples were collected by lowering a separate disposable bailer into each well. Groundwater was transferred from the bailer directly into the appropriate sample containers with preservative, if required, chilled, and processed for shipment to the laboratory. When transferring samples, care was taken not to touch the bailer-emptying device to the sample containers. Water samples were transported to Southland Technical Services, Inc., a certified laboratory by the California Department of Health Services (Cert. #1986) to perform the requested analysis.

Groundwater samples were collected from monitoring wells MW-17, MW-20, MW-15, MW-13, MW-9, MW-21, MW-12, MW-7, MW-14, MW-3, MW-16, MW-2, MW-11, MW-18, MW-19, and MW-10 only. Monitoring wells MW-4, MW-6, and MW-8 identified FP as LNAPL at a thickness of 0.06', 0.11' and 0.2', respectively. The FP thickness in MW-6 is assumed based on the depth of the well bottom since no water was identified in the well.

Vials for VOC and TPH analysis were filled first to minimize aeration of groundwater collected in the bailer. The laboratory provided vials containing sufficient HCl preservative to lower the pH to less than 2. The vials were filled directly from the bottom-emptying device. The vial was capped with a cap containing a Teflon septum. Blind duplicate samples for the laboratory were labeled as "MW-1" and "MW-5" and were collected from monitoring wells MW-19 and MW-10, respectively. All vials were inverted and tapped to check for bubbles to insure zero headspace.

New nitrile gloves were worn during by sampling personnel for each well to prevent cross contamination of the samples. A solvent free label was affixed to each sample container/vial denoting the well identification, date and time of sampling, and an identifying code to distinguish each individual bottle.

5.3) Sample Handling

VOA vials, including laboratory trip blanks, were placed inside of one new Ziplock bag per well and stored in a cooler chilled to approximately 4°C with bagged ice. Water samples were logged on the chain-of-custody forms immediately following sampling of each well to insure proper tracking through analysis to the laboratory.

5.4) Waste Management

FP, purged groundwater, and decontamination water were stored in sealed 55-gallon drums for a period not to exceed 90 days. Stored wastes will be profiled for hazardous constituents and characterized as Non-Hazardous, California Hazardous, or RCRA Hazardous, as appropriate. Any transportation of waste will be under appropriate manifest.

6.0) FREE PRODUCT

Monitoring wells MW-4, MW-6, and MW-8 identified FP as LNAPL at a thickness of 0.06-feet, 0.11-feet, and 0.20-feet, respectively. A total of 2 gallons of FP was recovered from MW-6 and 10 gallons of FP was recovered from MW-8 to date. Monitoring well MW-4 contained such a small amount of fluid within the well that a bailer was unable to retrieve any liquid.

Laboratory analysis of the FP was performed in June 2002 and identified dissolved TPH-gas at 812,000 mg/L from MW-6 and 801,000 mg/L from MW-8. Concentrations of dissolved TPH as diesel were also identified in FP as 53,400 mg/L from MW-6 and 56,600 mg/L from MW-8. No detectable concentrations of TPH as motor oil were identified in FP collected from both wells. Previous laboratory analysis of FP collected from monitoring well MW-6 identified 1,1,1-TCA at 28,100 mg/L, 1,2,4-Trimethylbenzene at 22,100 mg/L, Xylenes at 10,370 mg/L, Toluene at 9,010 mg/L, 1,3,5-Trimethylbenzene at 5,400 mg/L, and Ethylbenzene at 4,320 mg/L.

7.0) GROUNDWATER SAMPLE RESULTS

Groundwater samples collected from the shallow zone (Gasper) monitoring wells MW-7, MW-9, MW-10, MW-11, MW-12, MW-16, MW-18, and MW-19 in March 2003 contained TPH-gas ranging from 177,000 µg/L in MW-19 to 1,730 µg/L in MW-12. Laboratory results are included as Appendix B. Dissolved TPH-gas concentrations averaged 47,969 µg/L in the shallow Gasper Aquifer. See Table 1 and Figure 5 for dissolved TPH-gas concentrations. Note the upgradient legacy of high dissolved TPH-gas concentrations from 83,900 µg/L in MW-18 to 85,100 µg/L in MW-10 to 177,000 µg/L in MW-19.

Groundwater samples collected from the deeper zone (Gage/Hollydale) monitoring wells MW-2, MW-3, MW-13, MW-14, MW-15, MW-17, MW-20, and MW-21 in March 2003 contained TPH-gas ranging from 15,600 µg/L in MW-2 to <50 µg/L in MW-13 and MW-17. The concentrations of dissolved TPH-gas averaged 3,793 µg/L in the deeper Gage/Hollydale Aquifer. See Table 1 and Figure 6 for dissolved TPH-gas concentrations. Dissolved TPH-gas is at maximum concentrations along the southwestern property boundary, which could be attributed to an off-site source since the Gage/Hollydale hydraulic gradient is relatively flat at 0.007 ft/ft.

Concentrations of dissolved BTEX ranged between 19,930 µg/L in MW-19 to <74 µg/L in MW-9 from the shallow Gasper Aquifer (See Figure 5). The less than value includes those concentrations reported as Practical Quantitation Limit (PQL) which is defined as the method detection limit multiplied by the dilution factor. The average dissolved BTEX concentration in the Gasper from the 2003 first quarter sampling was <7,071 µg/L. Relatively high dissolved BTEX concentrations were observed in upgradient monitoring wells MW-10 as 15,912 and MW-18 as >10,220 µg/L.

Dissolved BTEX in the deeper Gage/Hollydale Aquifer ranged between 9,957 µg/L in MW-3 to <4 µg/L in MW-17 (See Figure 6). The 2003 first quarter sample episode identified an average dissolved BTEX concentration of <918 µg/L in the Gage/Hollydale. The maximum dissolved BTEX concentration was located along the southwest property line in monitoring well MW-3.

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Groundwater sample results from the shallow Gasper Aquifer identified relatively high VOC concentrations compared to the low VOC concentrations in the deeper Gage/Hollydale Aquifer (See Table 2 and Appendix B for laboratory results).

Concentrations of dissolved PCE and TCE were identified at a maximum concentration of 1,480 µg/L and 2,360 µg/L, respectively, in the Gasper from MW-19 (See Figure 7). Monitoring well MW-18 is located downgradient of the former chemical storage area of the neighboring McKesson site and upgradient of former ACC chemical storage. Groundwater collected from MW-18 contained dissolved PCE as <1,000 µg/L and TCE as 610 µg/L. Maximum concentrations of dissolved PCE and TCE in the Gage/Hollydale were detected as 411 µg/L and 1,930 µg/L, respectively from groundwater collected MW-3 (See Figure 8). Elevated PCE and TCE concentrations in groundwater were also identified as <20 µg/L and 134 µg/L, respectively, from MW-15. Dissolved VOC concentrations were detected at higher levels along the south side of the property.

Dissolved concentrations of 1,1,1-TCA were identified in the shallow Gasper Aquifer at a maximum of 37,800 µg/L in MW-19 (See Figure 7). Monitoring well MW-10 located upgradient of MW-19 identified dissolved 1,1,1-TCA as 12,300 µg/L. Groundwater collected from MW-18 located upgradient of MW-19 and MW-10 identified dissolved 1,1,1-TCA as 665 µg/L. Lower concentrations of dissolved 1,1,1-TCA were detected in the deeper Gage/Hollydale Aquifer at a maximum of 77.5 µg/L in MW-14 (See Figure 8). No dissolved 1,1,1-TCA concentrations were detected in monitoring wells MW-2 and MW-3 at >1,000 µg/L and >500 µg/L, respectively (relatively high detection limit due to dilution factors).

Groundwater samples were also analyzed for 1,4-Dioxane, a preservative used in 1,1,1-TCA to prolong its shelf life. However, 1,4-Dioxane is more miscible in groundwater than 1,1,1-TCA and will often lead the dissolved 1,1,1-TCA plume. Monitoring well MW-7 identified the maximum detectable concentration of dissolved 1,4-Dioxane at 21,900 µg/L in the Gasper Aquifer. Gasper monitoring wells MW-18 and MW-19 identified dissolved 1,4-Dioxane at <25,000 µg/L due to high dilution factors. The maximum detectable dissolved 1,4-Dioxane concentration in the Gage/Hollydale Aquifer was 112 µg/L in MW-20. Gage/Hollydale monitoring wells MW-2, MW-3, MW-14, MW-15, and MW-21 contained dissolved 1,4-Dioxane concentrations between <10,000 µg/L and <125 µg/L due to high dilution factors.

Concentrations of dissolved chlorinated VOC daughter products were relatively elevated compared to their respective parent VOCs and also showed a trend of higher dissolved concentrations in the shallow Gasper Aquifer compared to the deeper Gage/Hollydale Aquifer.

1,1-DCA is a daughter product from reductive dehalogenation of 1,1,1-TCA and from carbon-carbon double bond reduction of 1,1-DCE, another daughter product.

Dissolved 1,1-DCA concentrations were identified between 1,020 µg/L and 48,800 µg/L in the Gasper Aquifer (See Figure 7). The greatest dissolved 1,1-DCA concentration was observed in MW-11. Upgradient dissolved 1,1-DCA concentrations in the Gasper Aquifer were identified as 41,900 µg/L in MW-10 and 6,700 µg/L in MW-18. Dissolved 1,1-DCA concentrations in the Gage/Hollydale Aquifer ranged between 2.5 µg/L and 2,180 µg/L (See Figure 8). Monitoring wells MW-2 and MW-3 located along the southwest property boundary contained the highest dissolved 1,1-DCA concentrations in the Gage/Hollydale Aquifer as 2,180 µg/L and 1,710 µg/L, respectively. The next highest dissolved 1,1-DCA concentration was 276 µg/L in MW-21.

Dissolved 1,1-DCE, a daughter product of the dehydrohalogenation of 1,1,1-TCA and reductive dehalogenation of TCE, was identified at concentrations ranging from 16.5 µg/L to 18,600 µg/L in the Gasper Aquifer (See Figure 7). The maximum dissolved 1,1-DCE concentration was observed in MW-19. The next largest dissolved 1,1-DCE concentration was identified as 5,290 µg/L in groundwater collected from MW-18. Gasper monitoring well MW-18 is located upgradient of former ACC chemical storage including monitoring well MW-19. Dissolved 1,1-DCE concentrations in the Gage/Hollydale Aquifer ranged between 16.5 µg/L and 2,490 µg/L (See Figure 8). Gage/Hollydale monitoring well MW-2 located along the southwest property boundary contained the maximum dissolved 1,1-DCE concentration (2,490 µg/L).

Cis-1,2 DCE is also a daughter product of the dehydrohalogenation of 1,1,1-TCA and reductive dehalogenation of TCE. Concentrations of dissolved cis-1,2-DCE were identified between 18.6 µg/L and 21,200 µg/L in the Gasper Aquifer (See Figure 7). The greatest dissolved cis-1,2-DCE concentration was observed in MW-18 located along the southern upgradient side of the site. Dissolved cis-1,2-DCE concentrations in the Gage/Hollydale Aquifer ranged between 6.9 µg/L in MW-20 and 11,300 µg/L in MW-2 (See Figure 8). Gage/Hollydale monitoring well MW-3 located along the southwest property boundary next to MW-2 contained the second largest dissolved 1,1-DCE concentration of 3,090 µg/L.

Vinyl chloride (VC) is a by-product from the dehydrohalogenation and reductive dehalogenation of the chlorinated VOC daughter products mentioned above. Unlike the other VOCs, concentrations of dissolved VC were at higher concentrations in the deeper Gage/Hollydale than in the shallow Gasper Aquifer. Dissolved VC concentrations were identified between 66.6 µg/L and 3,690 µg/L in the shallow Gasper Aquifer (See Figure 7). Monitoring well MW-10 contained the largest dissolved VC concentration in the Gasper. However, dissolved VC concentrations in the Gage/Hollydale ranged from <2 µg/L to 7,870 µg/L (See Figure 8). The maximum dissolved VC concentration was located along the southwest property line in monitoring well MW-3.

Maximum dissolved concentrations of acetone and MEK were identified in Gasper monitoring well MW-19 as 70,200 µg/L and 28,900 µg/L, respectively (See Figure 9). Groundwater collected from MW-18 located upgradient of MW-19 and MW-

10 identified dissolved acetone as 39,700 µg/L and dissolved MEK as 23,900 µg/L. No detectable concentrations of acetone or MEK were identified above method detection limit from the 2003 first quarter groundwater monitoring episode in the Gage/Hollydale Aquifers (See Figure 10). However, the detection limits were high in some samples (<5,000 µg/L) due to the high dilution factors. Dissolved methylene chloride concentrations were identified in MW-19 at 12,500 from the Gasper and MW-3 at 1,630 from the Gage/Hollydale Aquifers. No other detectable concentrations of dissolved methylene chloride were identified. The detection limits for dissolved methylene chloride were high in some samples (<2,500 µg/L) due to the high dilution factors.

8.0) CONCLUSIONS

Based on the recent groundwater sample results, BEII concludes that the site is impacted by dissolved VOCs in both the Gasper and Gage/Hollydale Aquifers. Dissolved VOC concentrations, however, were detected at higher concentrations in the Gasper Aquifer compared to the Gage/Hollydale aquifer. Gasper monitoring wells located upgradient of former ACC chemical storage contained elevated dissolved VOC concentrations. Gage/Hollydale monitoring wells located along the southern property boundary contained the maximum dissolved VOC concentrations in that aquifer.

BEII also concludes that the recent groundwater sampling data provides preliminary support that the site has potential for intrinsic biodegradation. Dissolved parent VOC (PCE and TCE) concentrations were identified at concentrations ≤ 2,360 µg/L. 1,1,1-TCA was the only parent VOC that was identified at greater than 2,360 µg/L with an average concentration <3,320 µg/L from both aquifers combined. Daughter VOC constituents such as 1,1-DCA, 1,1-DCE, cis-1,2-DCE, and VC identified dissolved concentrations of up to 48,800 µg/L. However, further groundwater monitoring is needed to determine whether intrinsic biodegradation is occurring.

9.0) RECOMMENDATIONS

BEII recommends that quarterly groundwater monitoring for VOCs and TPH-gas be continued at the former ACC property. BEII further recommends that free product removal be performed on a monthly basis to reduce its mass.